

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants : Dureseti CHIDAMBARRAO, et al. Group Art Unit: 2814  
Appln. No. : 10/605,108 Examiner: PHAM, Long  
Filed : September 9, 2003 Confirmation No. 2107  
For : METHOD FOR REDUCED N+ DIFFUSION IN STRAINED SI  
ON SI/GE SUBSTRATE

**REPLY BRIEF UNDER 37 C.F.R. 41.41(a)(1)**

Commissioner for Patents  
U.S. Patent and Trademark Office  
Customer Service Window, Mail Stop **Appeal Brief - Patents**  
Randolph Building  
401 Dulany Street  
Alexandria, VA 22314  
Sir:

This Reply Brief is in response to the Examiner's Answer dated May 30, 2007  
(and the Supplemental Examiner's Answer dated July 18, 2007), the period for reply  
extending until July 30, 2007.

The Examiner maintains the grounds of rejection advanced in the final rejection of  
claims 16-18, 22-28 and 30-39, and provides arguments in support thereof.

Appellant notes this Reply Brief is being filed under 37 C.F.R. 41.41(a)(1) and is  
directed to the arguments presented in the Examiner's Answer, and therefore must be  
entered unless the final rejection is withdrawn in response to the instant Reply Brief.

With regard to this Reply Brief, Appellant notes it is addressing points made in the  
Examiner's Answer and not repeating the arguments set forth in the Appeal Brief.

**POINTS OF ARGUMENT****First Issue**

On pages 2 and 3 of the Examiner's Answer, the Examiner maintains that YOO teaches the recited source and drain extension regions 16 and 18 as well as ion implanting an interstitial element into the source and drain extension regions. Appellant submits that the Examiner's interpretation are neither reasonable nor supported by the disclosure of YOO.

YOO discloses implanting oxygen 30 to the regions 16 and 18 in order to form oxide layers 38 and source and drain regions 32 (see Figs. 2 and 3). However, in addition to failing to disclose the recited SiGe substrate (col. 3, line 44 of YOO explains only that layer 12 is a gate oxide), YOO fails to disclose, or even suggest, ion implanting an interstitial element into the source and drain extension regions.

**Second Issue**

On page 6 of the Examiner's Answer, the Examiner explains that because YOO teaches to implant the regions 32, because regions are part of regions 16 and 18, and because the claims can be read to encompass implantation which occurs on a small portion of the regions 16 and 18, YOO can be read to teach that the implantation forms low-vacancy regions that substantially overlap the source and drain extension regions.

Appellant disagrees. Claim 16 (as well as claim 39) specifically recites that the implanting forms low-vacancy regions that substantially overlap the source and drain extension regions. As such, claim 16 (and claim 39) requires that the formed low-

vacancy regions overlap nearly all of the source and drain extension regions.

In contrast, Fig. 2 of YOO clearly shows that the oxygen implantation is focused onto only a tiny portion of the regions 16 and 18. As such, YOO clearly fails to specifically disclose or suggest that the oxygen implantation 30 forms low-vacancy regions that substantially overlap the source and drain extension regions, that is, that overlap nearly all of the source and drain regions, much less, source/drain extension regions.

### **Third Issue**

On page 3 of the Examiner's Answer, the Examiner explains that the combination of AAPA and YOO would inherently result in a semiconductor device which has formed low-vacancy regions that substantially overlap the source and drain extension regions.

This has not been demonstrated by the Examiner. YOO discloses that the oxygen implantation occurs at an angle of between 30 and 60 degrees (see col. 4, line 4-7) and at a dose that is only in the range of  $1 \times 10^{12}$  to  $1 \times 10^{13}$  atoms/cm<sup>3</sup> (see col. 4, lines 1-4). Accordingly, it is not apparent (and clearly not disclosed) that such an implantation step would result in the formation of low-vacancy regions that substantially overlap the source and drain extension regions.

Appellant reminds the Examiner that the ion implantation of the invention occurs at higher concentrations such as, e.g.,  $1 \times 10^{14}$  to  $1 \times 10^{16}$  atoms/cm<sup>2</sup>, that Fig. 4 of the instant application clearly shows that the ion implantation B occurs over most of the source/drain extension regions 24, and that, as a result, the low-vacancy regions 26

substantially overlap the source and drain extension regions 24.

**Fourth Issue**

On page 4 of the Examiner's Answer, the Examiner explains that the combination of AAPA and YOO teaches that implantation takes place into the source and drain regions after the sidewalls are formed on the sides of the gate electrode (claims 38 and 39).

Appellant disagrees. AAPA does not teach this feature and the Examiner has not demonstrated otherwise. Furthermore, YOO specifically discloses an implantation step (see Fig. 2) which occurs before (not after) the step of forming the sidewalls 33 (see Fig. 3). Indeed, in implanting step shown in Fig. 2 of YOO, no sidewalls or sidewall spacers 33 are yet formed. Furthermore, col. 4, lines 8-10 of YOO specifically explains that "FIG. 3 shows a cross section of the gate electrode after the gate spacers 33 have been formed ..." (emphasis added).

Thus, no proper combination of AAPA and YOO teaches that implantation takes place into the source and drain regions after the sidewalls are formed on the sides of the gate electrode (claims 38 and 39).

**Fifth Issue**

Throughout the Examiner's Answer, the Examiner makes various assertions of inherency. Appellant submits that such assertions are not consistent with MPEP 2112, which specifically states, in part:

"In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." *Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis in original) (Applicant's invention was directed to a biaxially oriented, flexible dilation catheter balloon (a tube which expands upon inflation) used, for example, in clearing the blood vessels of heart patients). The examiner applied a U.S. patent to Schjeldahl which disclosed injection molding a tubular preform and then injecting air into the preform to expand it against a mold (blow molding). The reference did not directly state that the end product balloon was biaxially oriented. It did disclose that the balloon was "formed from a thin flexible inelastic, high tensile strength, biaxially oriented synthetic plastic material." *Id.* at 1462 (emphasis in original). The examiner argued that Schjeldahl's balloon was inherently biaxially oriented. The Board reversed on the basis that the examiner did not provide objective evidence or cogent technical reasoning to support the conclusion of inherency.).

The Examiner has provided no basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art.

### **Sixth Issue**

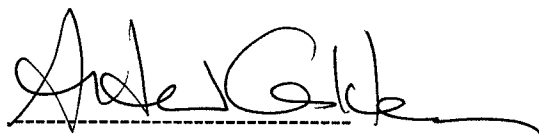
On pages 5-7 (Response to Argument section) of the Examiner's Answer, the Examiner asserts that Appellant has the burden of proving that certain recited values or ranges are critical.

The Examiner has failed to identify any basis in patent law for this assertion. Patentability is not determined on the basis of critical features. Appellant is unaware of any law which asserts the contrary. The recited ranges are not disclosed or suggest in the applied art and the Examiner has not demonstrated otherwise.

CONCLUSION

Accordingly, in view of the above-noted arguments (as well as those already of record), the Board is respectfully requested to reverse the Examiner's decision to finally reject claims 16-18, 22-28 and 30-39 under 35 U.S.C. §103. Furthermore, the application should be remanded to the Examiner for withdrawal of the rejection over the applied documents and an early allowance of all claims on appeal should be provided. The Commissioner is hereby authorized to charge any fees necessary for consideration of this paper to deposit account No. 09-0458.

Respectfully submitted,  
Dureseti CHIDAMBARRAO, et al

A handwritten signature in black ink, appearing to read 'Andrew M. Calderon', written over a horizontal dashed line.

Andrew M. Calderon  
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July 26, 2007  
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